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ABSTRACT

Designed to use simple materials that can be found in almost any household, this document provides elementary teachers and students with activities and worksheets that deal with basic scientific concepts. The activities are intended to help students form and test their own hypotheses. Each topic in the booklet is addressed through a simple experiment and a reproducible worksheet which students can use to record their data. The experiments and activities deal with: (1) absorption of heat; (2) capillary action; (3) cold and warm air; (4) colored pigments; (5) colored lights; (6) condensation; (7) conduction of heat; (8) evaporation; (9) friction; (10) jet propulsion; (11) magnetic attraction; (12) molecular motion; (13) reflections; (14) oils; (15) pulse rate; (16) shadows; (17) sounds; (18) starches; (19) static electricity; (20) sundials; and (21) surface tension. Included are a science word search and some reproducible science award certificates. (TW)

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A Good Apple Activity Book

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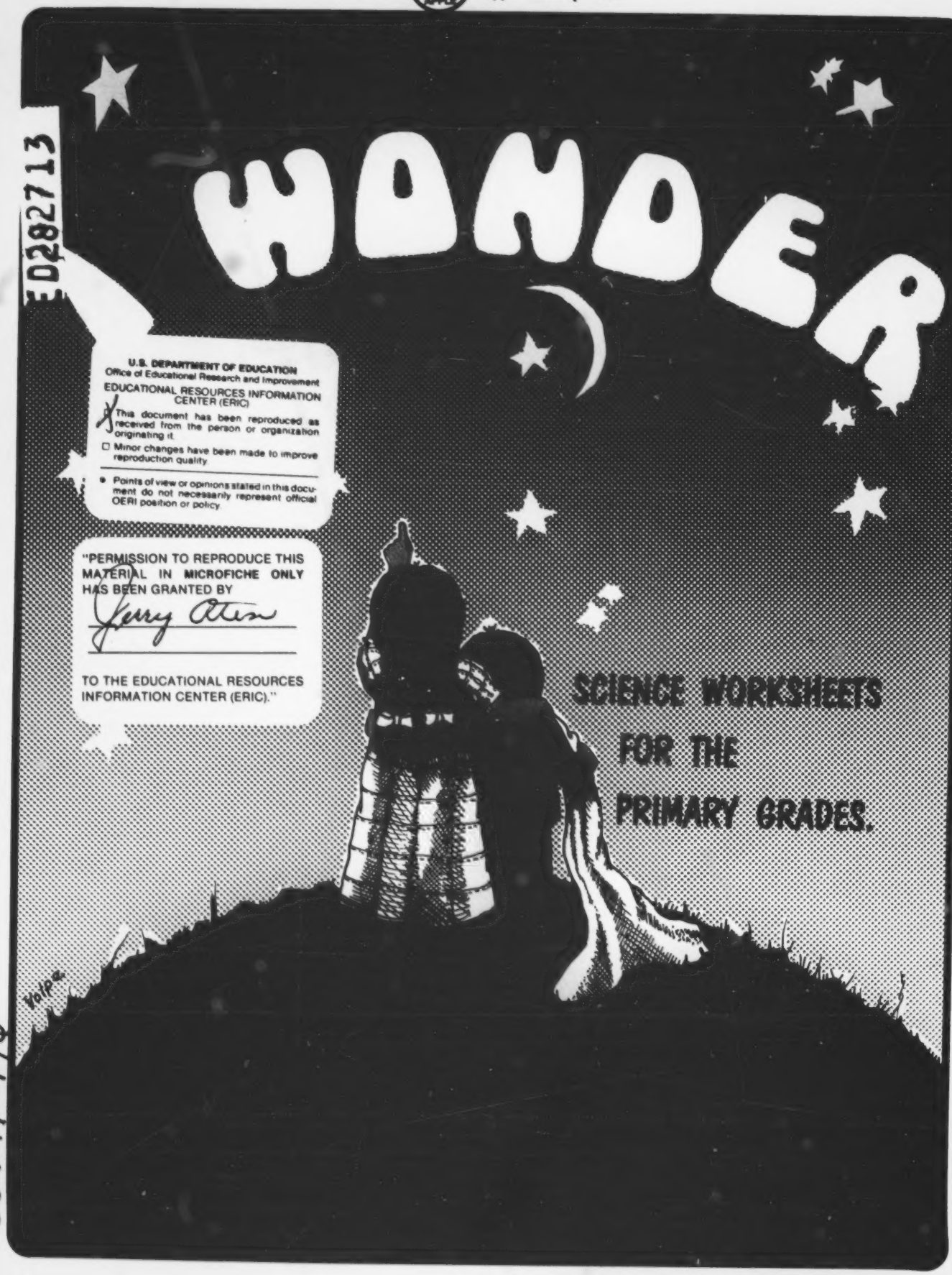

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By Becky and Charlie Daniel

I WONDER

by

Charlie and Becky Daniel

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To The Teacher

The basic science experiments in this book can be performed with simple, everyday things that can be found in almost any household. With the aid of these simple items, children can enjoy the wonders of science. Everyday life can be transformed into a voyage of discovery full of adventures and surprises. You can introduce your students to the exciting wonder of science. However, you should act only as the guide on this journey. The students must make their own discoveries. The joy of science is not just in the reading, but also in the doing!

Students should practice using the scientific method of discovery as they form and test their hypothesis. Experiments are important to scientists in gaining accurate information. Scientists observe for a period of time and make careful records. They collect and look at things, comparing similarities and differences. They read what others have written about the subject they are studying. And they conduct experiments to test their hypothesis.

Observation and accurate records are essential. Encourage your students to use the scientific approach to experimentation. The question asked before each experiment may be used as the hypothesis, but it is better if students can arrive at their own hypothesis.

Collecting and comparing with others is also important. Children should be encouraged to exchange ideas and answers. They should note the similarities in their discoveries and in the ways which they differ. Worksheets should be compared and discussed. Many correct answers may be arrived at. The important thing is to discuss and understand those factors which caused the differences in collected data.

Reading what others have written about the subject will be useful in checking results. Students can use the school library to check similar experiments in science books. Encourage new and creative ideas. If students think of new

questions or new hypothesis while performing an experiment, encourage them to jot down their ideas. They can then think up new experiments that may answer their questions. The experiments in this book will just be a beginning to the scientific discoveries that can be made in your classroom. When children begin to understand the scientific method of discovery, they will have many new questions and ideas for discovering basic laws of nature.

There are many ways to present this material. You, the teacher, will know the best way for your own class. However, a few suggestions for extending these experiments follow for your convenience.

Absorption of Heat: The recorded information on this worksheet will vary depending on the temperature when the students perform the experiment. If it is not an extremely warm day, the time intervals may well be changed to every half hour or every hour. This may be a good time to discuss centigrade and fahrenheit scales for measuring temperature.

Capillary Action: If the children enjoy making the salt gardens, there are other recipes for chemical gardens that grow larger and more quickly.

Capillary Action: This is an excellent time to discuss the small vessels in the human body called capillaries. This experiment will demonstrate the way capillaries move nutrients and liquids throughout the body.

Cold and Warm Air: After the air in the balloon reaches the same temperature as the air surrounding it, the balloon will not get any smaller. You may want to have some students place their balloons in a freezer. Encourage your students to compare the size differences when placed in a refrigerator as compared to placing them in a freezer.

Colors: The size of the arc may differ, but the arrangement of the colors will be the same on all rainbow arcs. You might want to discuss what causes rainbows to appear in the sky after it has rained and the sun is shining brightly.

Colored Pigments: Explain to your students the importance of using uniform-sized drops. The name for the color mixtures may vary. While one student may call a mixture "purple," another might call it "lavender." It might be fun to have students re-name all colors as if they have created new colors for house paints. For example, yellow might be called "Yummy Lemon," etc.

Colored Lights: This experiment will demonstrate the mixture of primary colors and will provide insight as to how color televisions can produce the entire color spectrum using only these three colors.

Condensation: After performing this experiment ask your students to explain why windows fog up on the inside on cold days. Discuss other times condensation takes place. Have students identify the necessary elements needed in order for condensation to occur.

Conduction of Heat: If you do not have a cool place to put the bottles, you may change the time intervals to half-hours or hours. To extend the experiment, keep measuring until all water temperatures have reached room temperature.

Dissolving: This may be a good time to discuss how different types of soil erode at different rates.

Evaporation: The worksheet answers will vary depending on the size of square the students draw. To expand this experiment, have students draw squares of specific sizes. Let them complete the worksheet again using the carefully measured squares. Compare the worksheets of students who used large squares with those of students using smaller ones. From all the information on the worksheets, a few students may want to graph the information.

Friction: The class might enjoy listing tools, toys, machines, etc., that make use of the principles of friction.

Jet Propulsion: Many students will be anxious to share their "balloon jets" with their classmates. Encourage students to

demonstrate their creations. Perhaps a race can be arranged to see which student can design the fastest "balloon jet."

Magnetic Attraction: This experiment will provide a good starting point for a discussion on the way a compass works. You might want students to do some research on the compass and its origin.

Molecular Motion: It might also be interesting to have your students fill in the worksheet before and after performing the experiment. They will then be in a position to compare the drawings to see just how accurately they were able to estimate the outcome of the experiment.

Reflections: When we look into a mirror at our reflections, do we see the exact thing other people see when they look at us? Mirrors are often deceiving. For example, mirrors make the space in a small room appear larger. Have students discuss how important mirrors are in our everyday lives. For example--a rearview mirror in an automobile.

Oils: Why are people so concerned about giant oil spills in the oceans? This experiment will be a good place to begin a study of water pollution.

Pulse Rate: Students may want to graph the pulse rates of all members of the class. Each student can graph a different activity. For example: pulse rate after running in place; pulse rate after eating lunch; or pulse rate while watching a horror movie on television.

Shadows: After students practice shadow animals, encourage them to write a short skit or play and present their "shadows" to the rest of the members of the class.

Sounds: Students who take music lessons may be able to play familiar tunes on pop bottles. It might be fun to have a contest to determine if students can identify familiar tunes that are played by other classmates.

Starches: Iodine is one chemical that is often used to test another. A class discussion on using a known chemical to discover other unknown chemicals might be interesting. For exam-

ple: litmus paper is used to test for an acid or base. Much of chemical analysis uses the principle of known chemicals and their reaction to discover and understand the unknown.

Static Electricity: After performing this experiment, see if students understand why one gets a shock after walking across a rug on a dry day.

Sundial: Talk with your students about other ways we use the sun to measure. Then measure the height of a tree using the sun and the shadow of the tree. Put a stick into the ground near the tree. When the shadow of the stick is exactly the length of the stick, the shadow of the tree will be the same length as the height of the tree. Let students measure some tall trees and buildings using the sun.

Surface Tension: Soap bubbles are another example of surface tension. It might be fun to have a "soap bubble day." After spending time blowing and enjoying the bubbles, see if the students see the connection between the bubbles and the experiment.

To The Student

SUGGESTIONS FOR PERFORMING SCIENCE EXPERIMENTS:

1. Form your hypothesis before you begin your experiment.

2. Gather all your materials together before you start.

3. Read over and think about the plans of the experiment before you start. Make certain you understand all the directions.

4. Follow the plans very carefully.

5. As you perform the experiments, watch, listen, think and accurately record all of your results.

6. If you need further information after completing the experiment, you may need to repeat a part or all of the experiment.

7. During the experiment you may have thought of some new unanswered questions. Think of an experiment that would help you to answer these questions. Perhaps the teacher will let you perform your new experiment.

8. When you have finished your experiment, be certain to clean up and put away all materials you have used in their appropriate place.

9. After completing the experiment, discuss your results with other classmates. Compare your worksheet answers. Note how your results are similar and how they differ.

10. Evaluate yourself. What mistakes did you make? How could you have improved on your results of this experiment?

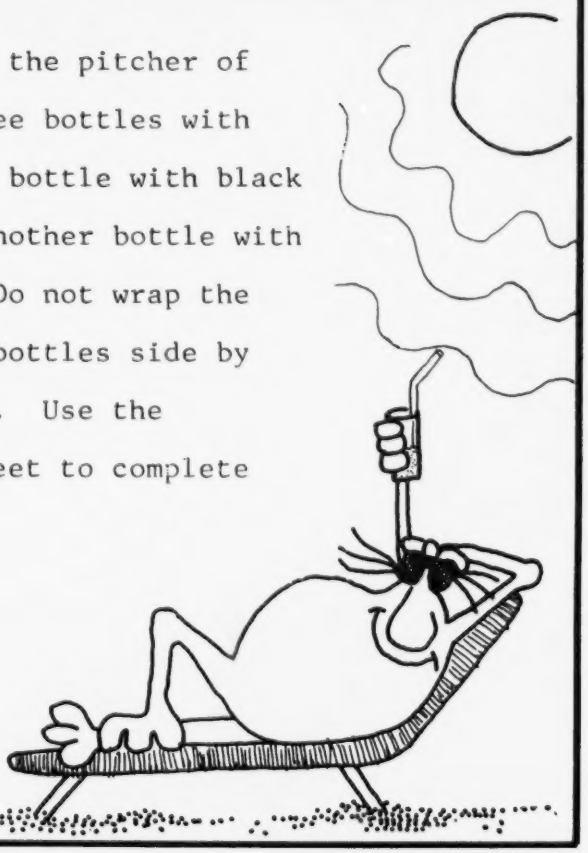
11. Evaluate the experiment. Did it answer the question you had in mind? How could the experiment have been better? How could the worksheet have been better? How would you change the entire experiment to make it better?

Absorption of Heat

YOU WILL NEED:

3 small bottles (the same size)
a pitcher of cold water
a thermometer with a wide temperature range
a sheet of black paper
a sheet of white paper
tape

DIRECTIONS: Record the temperature of the pitcher of cold water. Fill the three bottles with the cold water. Wrap one bottle with black paper and secure. Wrap another bottle with white paper and secure. Do not wrap the third bottle. Place the bottles side by side in the warm sunshine. Use the Absorption of Heat Worksheet to complete this experiment.



ABSORPTION OF HEAT WORKSHEET

	Temperature of bottle wrapped in black paper	Temperature of bottle wrapped in white paper	Temperature of the unwrapped bottle
Beginning temperature			
Temperature after 15 minutes			
Temperature after 30 minutes			
Temperature after 45 minutes			
Temperature after 60 minutes			

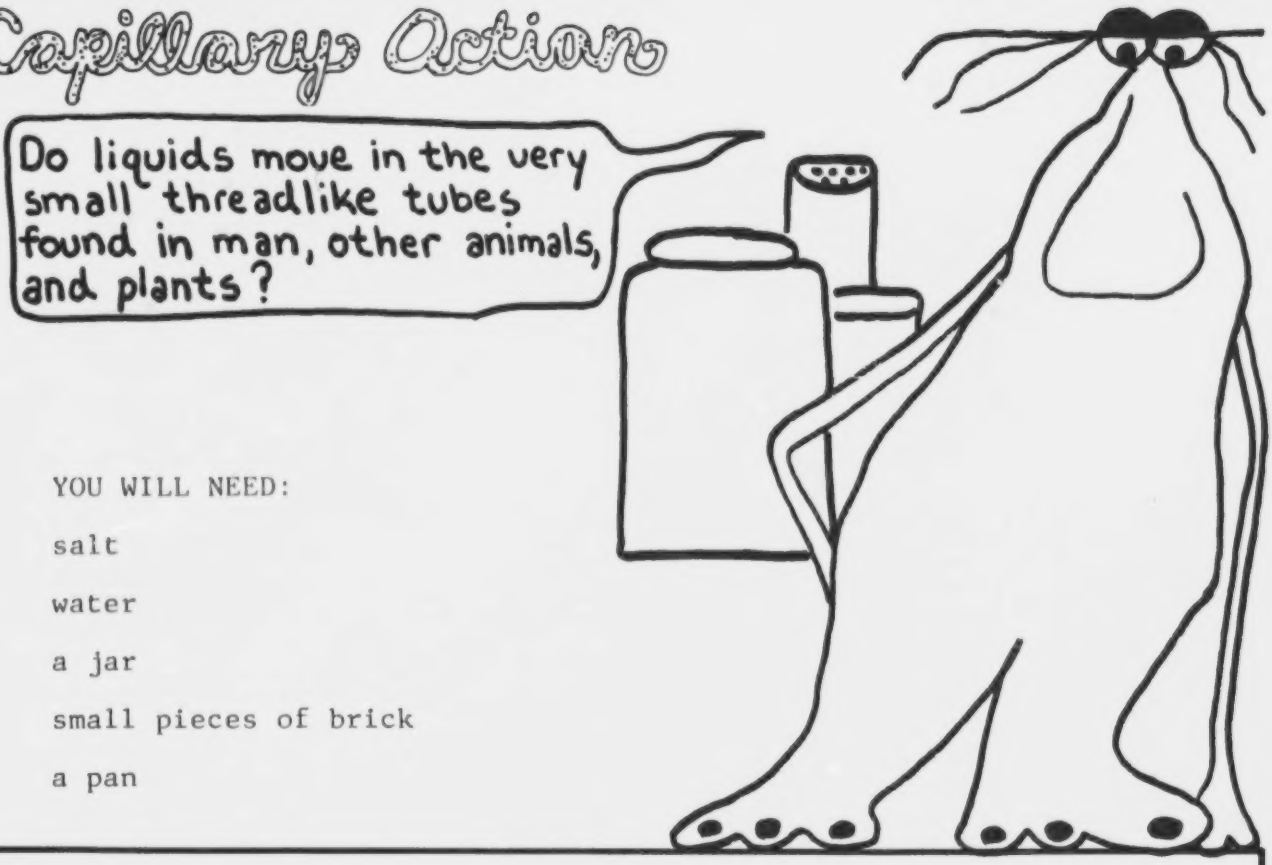
Use your dictionary to define each word listed below.

absorption:

temperature:

insulate:

Capillary Action



YOU WILL NEED:

salt

water

a jar

small pieces of brick

a pan

DIRECTIONS: Mix 2 cups of water and salt in a jar. Keep adding and stirring salt in the water until the water will not dissolve any more salt. Then pour the clear salt solution into a pan. Carefully lay the pieces of brick in the center of the pan. The water should not cover the brick pieces. Let the brick stand for a few days. After the salt crystals form on the bricks you may want to drop some food coloring on them to create a beautiful and colorful salt garden.

Capillary action Worksheet

Use words found in the word bank to complete the explanation for the results of this experiment.

WORD BANK:

openings

evaporates

salt

salt water

brick

Capillary action means the _____ _____ is drawn through the small _____ in the _____ until it reaches the sides and top of the brick. Then the water _____ into the air and leaves the _____ behind.

Unscramble these words, then find and circle each one hidden in the letter maze.

v o l e s i d s _____

t u l i o o n s _____

s y r c a l t s _____

r i n g r i t s _____

d i k e l a e r t h _____

q u i l i s d _____

t h r e a d l i k e t h

d i k e l q e s r e s t

c i t h r e a t a d t h

l r s o l u t i o n i r

i l y s t i r r i n r e

q i i s o l i r u o r a

u q u t t l a i d s i d

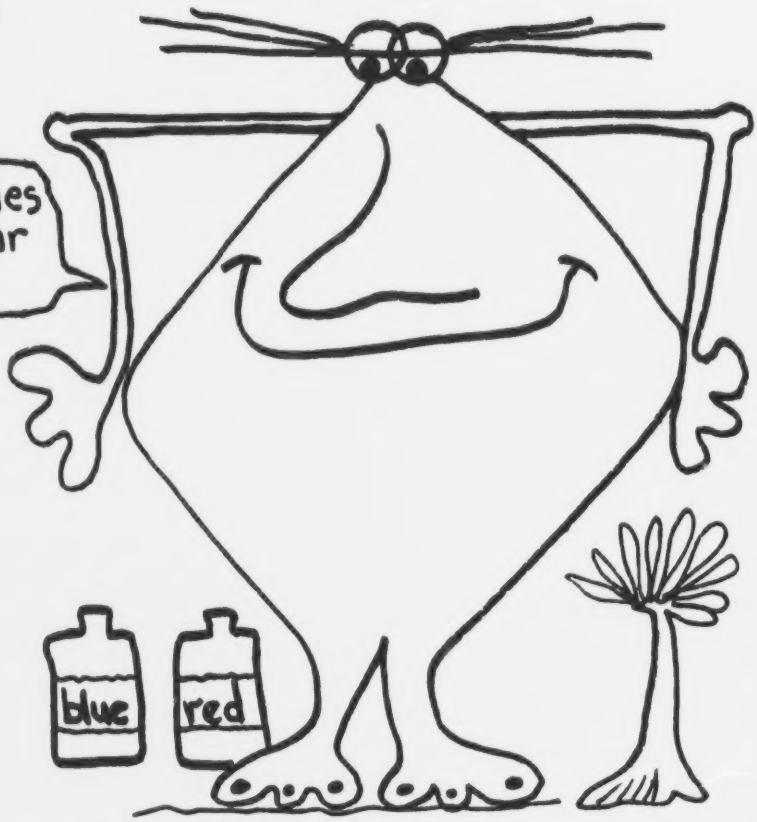
i d s i t a v n t i n s

d s t r h e l e r r g t

s i r r i n g s i n g i

Capillary Action

Do you think the capillaries in your body are similar to those in celery?



YOU WILL NEED:

1 stick of celery

red food coloring

blue food coloring

2 glasses of water

1 butter knife

DIRECTIONS: Fill both glasses half-full of water. Color one dark red and color one dark blue. Use several drops of food coloring to be sure your water is dark enough. Cut the stick of celery up the middle half-way up the stick. Put one-half of the celery down into the red liquid and one-half of the celery down into the blue liquid. Use the Capillary Action Work-sheet to complete this experiment.

Capillary Action Worksheet

Draw and color a picture of the celery after 30 minutes.	Draw and color a picture of the celery after one hour.
Draw and color a picture of the celery after 2 hours.	Take the celery out of the liquids. Cut tiny pieces across the celery. Draw and color a picture of how the tiny pieces look.

COLD and WARM AIR

YOU WILL NEED:

a balloon

a refrigerator

a tape measure

DIRECTIONS: Blow up a balloon and tie it very tightly, so no air can escape. Measure around the balloon at the biggest part. Record the size of the balloon on The Cold and Warm Air Worksheet. Next place the balloon in a refrigerator for 60 minutes. Measure around the balloon and record the size of the balloon on the worksheet. Do you think air takes up more room when it is cold or warm?

COLD and WARM AIR WORKSHEET

1. Original size of the balloon _____

2. Size of the balloon after being in the refrigerator 60 minutes

   _____

3. Does air take up more room when it is cold or warm?

   _____

4. Do not do this experiment, because the balloon would probably melt, but if you could heat the air inside the balloon, do you think it would take up more space? _____
   What might happen to the balloon? _____

5. Does air have weight? Weigh a football. Then let the air out of the football and weigh it again. From this experiment do you think air has weight? _____

6. Look up the two words found below in your dictionary. Use each word in a sentence about cold or warm air.

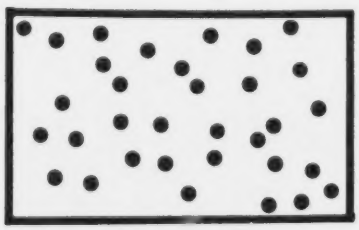
   expand: _____

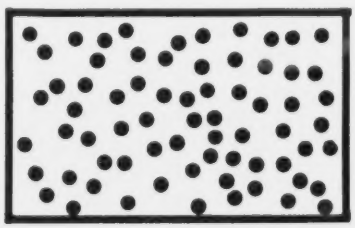
   _____

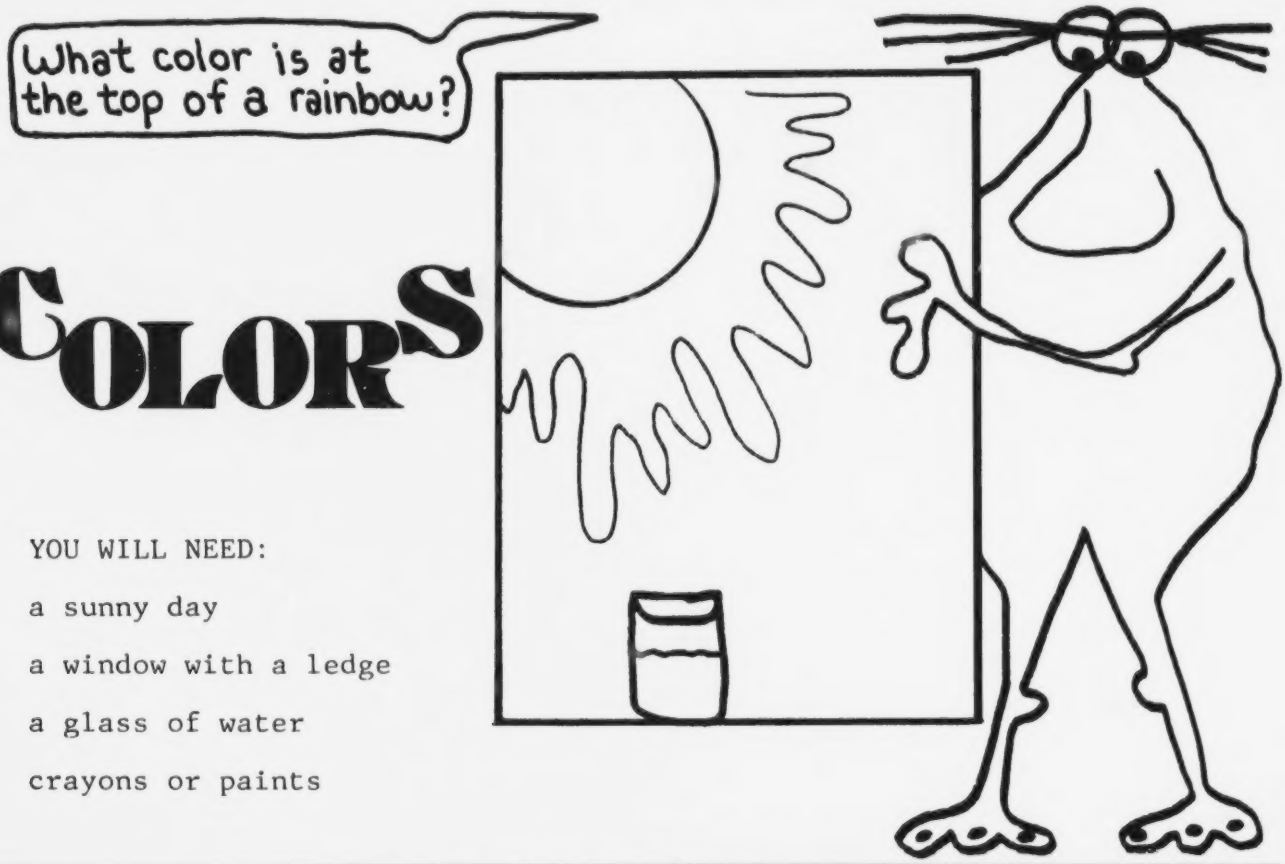
   contract: _____

   _____

7. Air is made up of tiny atoms from different gasses. When air is cold these atoms are close together. When air is heated the air atoms move further apart. Look at the two illustrations below. Label each one either cold or warm air.







COLORS

YOU WILL NEED:

a sunny day

a window with a ledge

a glass of water

crayons or paints

DIRECTIONS: Place a full glass of water on a window ledge in bright sunshine. Allow the glass to hang a little over the inside edge of the window ledge. If the sun is shining on the glass, there will probably be a spectrum band or rainbow of colors on the floor. Place the Colors Worksheet on the floor so the spectrum band falls directly on it. Use your crayons or paints to duplicate the rainbow and then answer the questions below.

1. What color is at the top of the arc of the rainbow?

_____

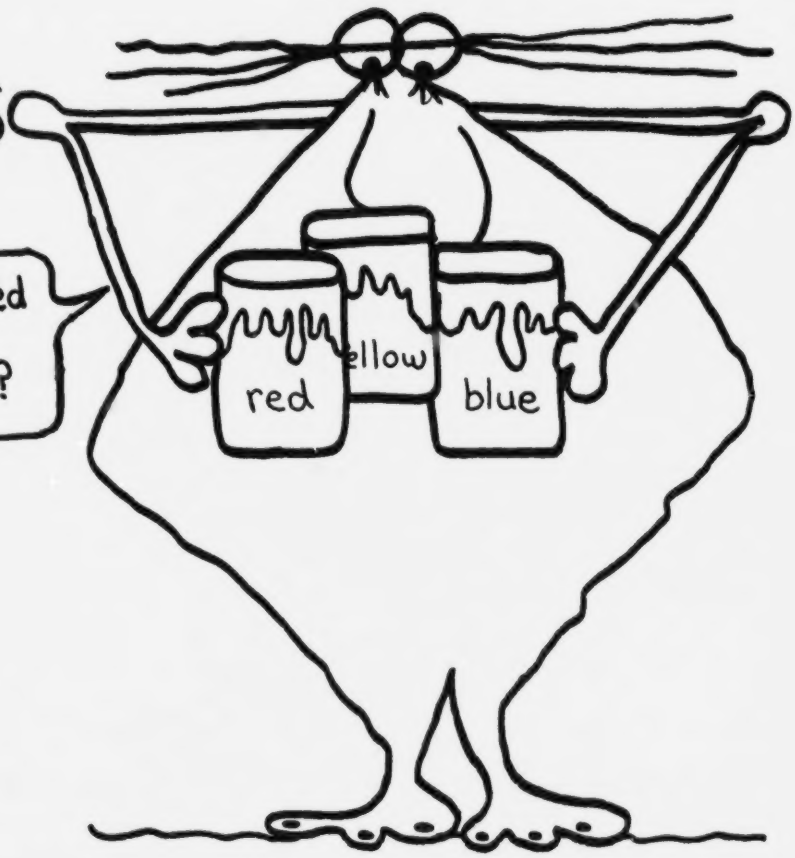
2. What color is at the bottom of the arc of the rainbow?

_____

Colors Worksheet

MY RAINBOW

COLORED PIGMENTS



YOU WILL NEED:

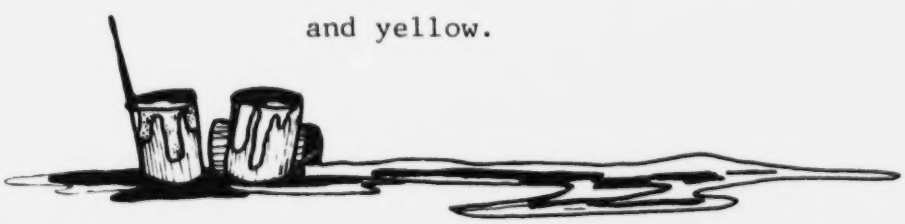
red paint

yellow paint

blue paint

brushes

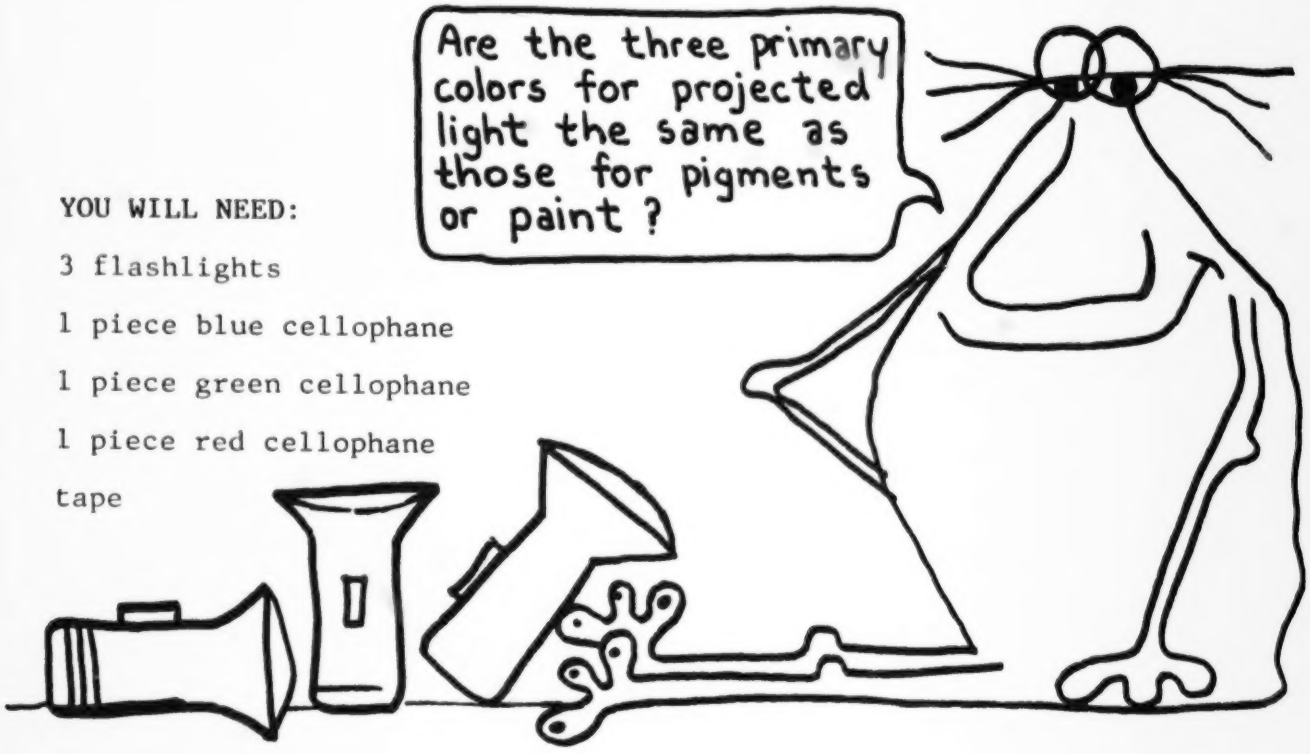
DIRECTIONS: The object of this experiment is to mix the primary colors and observe and record the results. Use the Color Pigment Worksheet to complete this experiment. Drop the correct amounts listed in each box and mix. Record the color that results. Be careful to clean your brush after each mixture is completed. The primary colors in pigments are red, blue, and yellow.



Colored Pigments Worksheet

1 drop yellow + 1 drop red Color: _____	1 drop red + 1 drop blue Color: _____
1 drop yellow + 1 drop blue Color: _____	1 drop yellow + 2 drops red Color: _____
1 drop yellow + 2 drops blue Color: _____	1 drop blue + 2 drops red Color: _____
1 drop blue + 2 drops yellow Color: _____	1 drop red + 2 drops blue Color: _____
1 drop red + 2 drops yellow Color: _____	1 drop red + 1 drop yellow + 1 drop blue Color: _____

Colored Lights



YOU WILL NEED:

3 flashlights

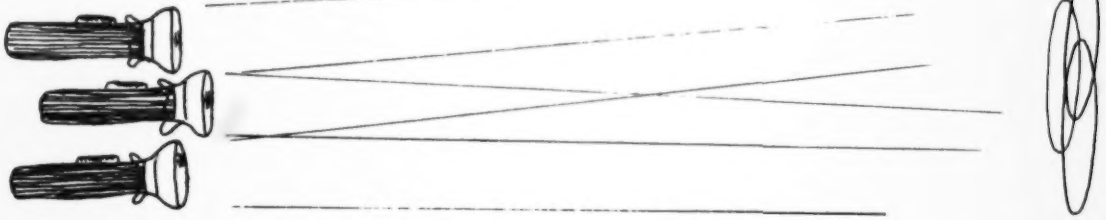
1 piece blue cellophane

1 piece green cellophane

1 piece red cellophane

tape

DIRECTIONS: Cover the front end of each flashlight with a different colored piece of cellophane. Tape them securely. Project the beams of light on a piece of white cardboard or the wall of a darkened room. Overlap the circles of light. The primary colors of light are red, green, and blue. Use the Colored Lights Worksheet to complete this experiment.



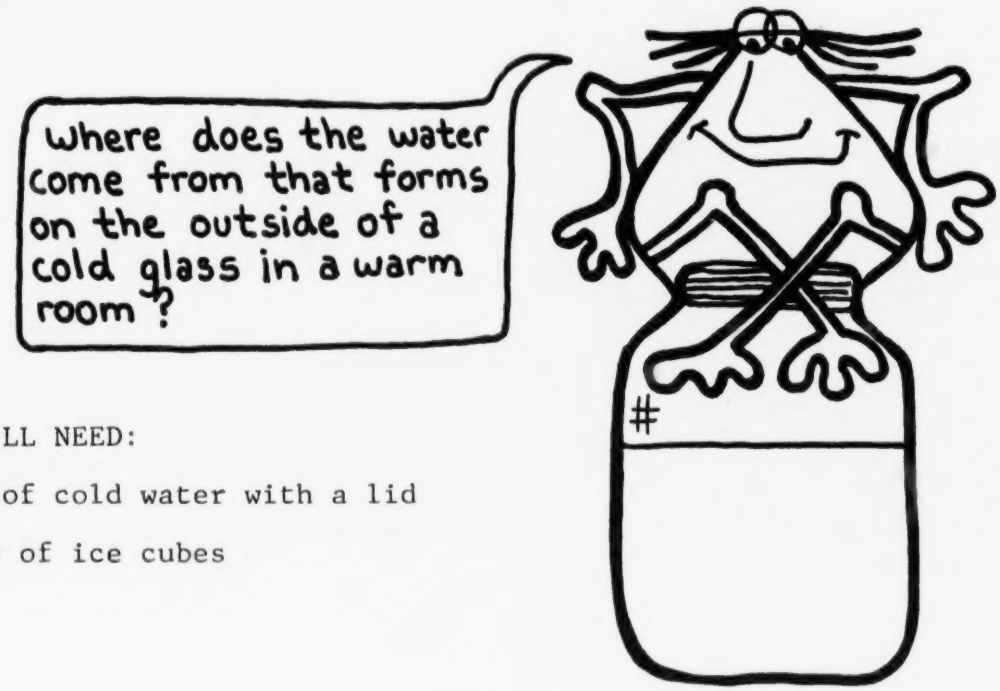
Colored Lights Worksheet

1. Green light and red light makes _____.
2. Blue light and green light makes _____.
3. Red light and blue light makes _____.
4. Green light, blue light, and red light makes _____

_____.

DRAW AND COLOR A LIGHT WHEEL.

CONDENSATION



YOU WILL NEED:

a jar of cold water with a lid

a tray of ice cubes

DIRECTIONS: Put some cold water in a glass jar. Place some ice cubes in the water. Put the lid on the jar. Shake it up. Let the jar stand in a warm room for ten minutes. Then answer the questions found below.

1. What happens to the outside of the jar?

   _____

2. Where do you think the drops of water came from?

   _____

3. Could they have come from the inside of the jar?

   _____

4. Could they have come from the air outside the jar?

   _____

CONDUCTION OF HEAT

YOU WILL NEED:

3 bottles the same size (with lids)

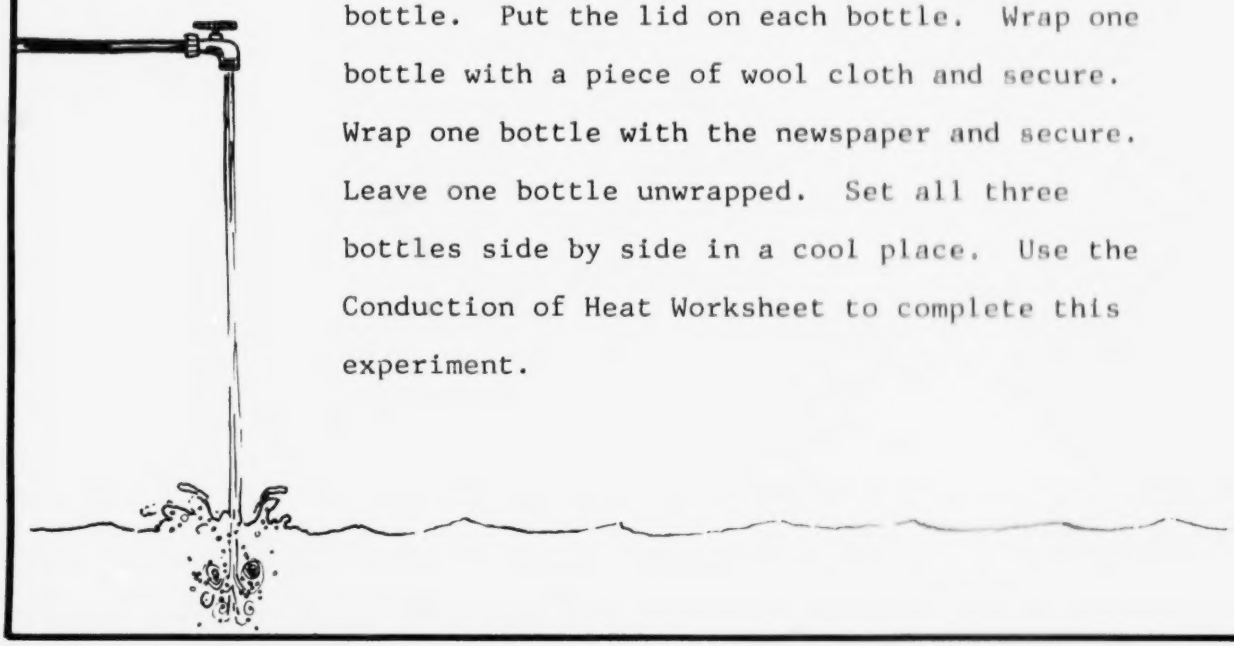
a pitcher of hot water

a cooking thermometer

a piece of wool cloth

a piece of newspaper

DIRECTIONS: Record the temperature of the pitcher of water. Pour an equal amount of hot water into each bottle. Put the lid on each bottle. Wrap one bottle with a piece of wool cloth and secure. Wrap one bottle with the newspaper and secure. Leave one bottle unwrapped. Set all three bottles side by side in a cool place. Use the Conduction of Heat Worksheet to complete this experiment.



Conduction of Heat Worksheet

	Temperature of unwrapped bottle.	Temperature of bottle wrapped in newspaper.	Temperature of bottle wrapped in wool.
Beginning temperature			
Temperature after 15 min.			
Temperature after 30 min.			
Temperature after 60 min.			

1. Is wool a good thing to wear to keep warm? _____

2. Why do you think it is important to insulate houses?

_____

3. Name three things that you think would make good materials for covering the jars to retain the heat. _____,

_____, & _____.

4. Do you think the color of the wrapper would make a difference in retaining heat? _____

DISSOLVING

YOU WILL NEED:

a cup or bowl
3 teaspoons of salt
3 teaspoons of sugar
3 teaspoons of sand
1 spoon
hot water
cold water
lukewarm water

DIRECTIONS: Look up the word dissolve in your dictionary before you begin this experiment. Place 1 teaspoon of salt in a glass of cold water. Do not stir. Does it dissolve? Use the Dissolving Worksheet to complete this experiment. Follow the directions carefully as you record your answers. After you complete the worksheet, answer the questions below.

1. Did the sugar, salt, and sand dissolve better if you stirred them? _____

2. Do they dissolve better in cold, lukewarm, or hot water?

_____

3. How many of the substances dissolved in your experiment?

_____

DISSOLVING WORKSHEET

	COLD WATER	LUKEWARM WATER	HOT WATER
Does salt dissolve without stirring?			
Does sugar dissolve without stirring?			
Does sand dissolve without stirring?			
Does salt dissolve if stirred?			
Does sugar dissolve if stirred?			
Does sand dissolve if stirred?			

What conclusions do you have about dissolving?

_____

_____

EVAPORATION

YOU WILL NEED:

a blackboard

a piece of chalk

2 wet paper towels

a stop watch

DIRECTIONS: Get a friend to help in this experiment. Draw two large squares on the blackboard. Make each square wet by rubbing them with a wet paper towel. Use the stop watch to time how quickly each square dries. Try fanning one square. Then answer the questions below.

1. How many seconds did it take each square to dry?_____
2. How many seconds did it take the squares you fanned to dry?_____
3. Change the size of the square and time the drying times again. Does a smaller area dry faster?_____
4. Use hot water to wet the square. Does the temperature of the water used to wet the surface change the drying time?_____
5. If you used ice cold water to wet the square, would the drying time slow down or speed up?_____

FRICTION

How does friction help in a game of tug-of-war?

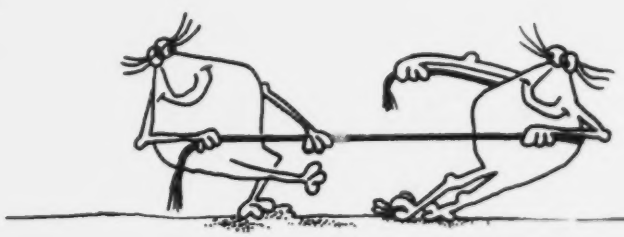
YOU WILL NEED:

at least six friends

a long rope

a big tree

DIRECTIONS: Get some friends. Wrap the rope around the base of a big tree one time. You stand on one side of the tree and hold the rope with just one hand. Ask your friends, one at a time, to pull on the other end of the rope. Try this tug-of-war against 2, then 3, then 6 friends. Answer the questions found on the Friction Worksheet.



FRICTION WORKSHEET

1. Can you hold your end against 2 people? _____
2. Can you hold your end against 3 people? _____
3. Can you hold your end against 6 people? _____
4. What is the most amount of people you can hold your end against?

   _____

5. Your newly acquired strength is accomplished by making use of friction. Look up the word friction in your dictionary and write the definition below.

   _____

   _____

6. Give a book a quick push so that it will slide along a table and stop before it reaches the other end. What caused it to slow down and stop? _____
7. Give the same book a quick push on the floor. Did it go farther on the floor or on the table? _____
8. What do you think would be the results if you pushed the book along a very rough surface? _____

   _____

9. If you had used a very smooth rope and picked a tree with smooth bark, would your tug-of-war game have been so simple?

   _____

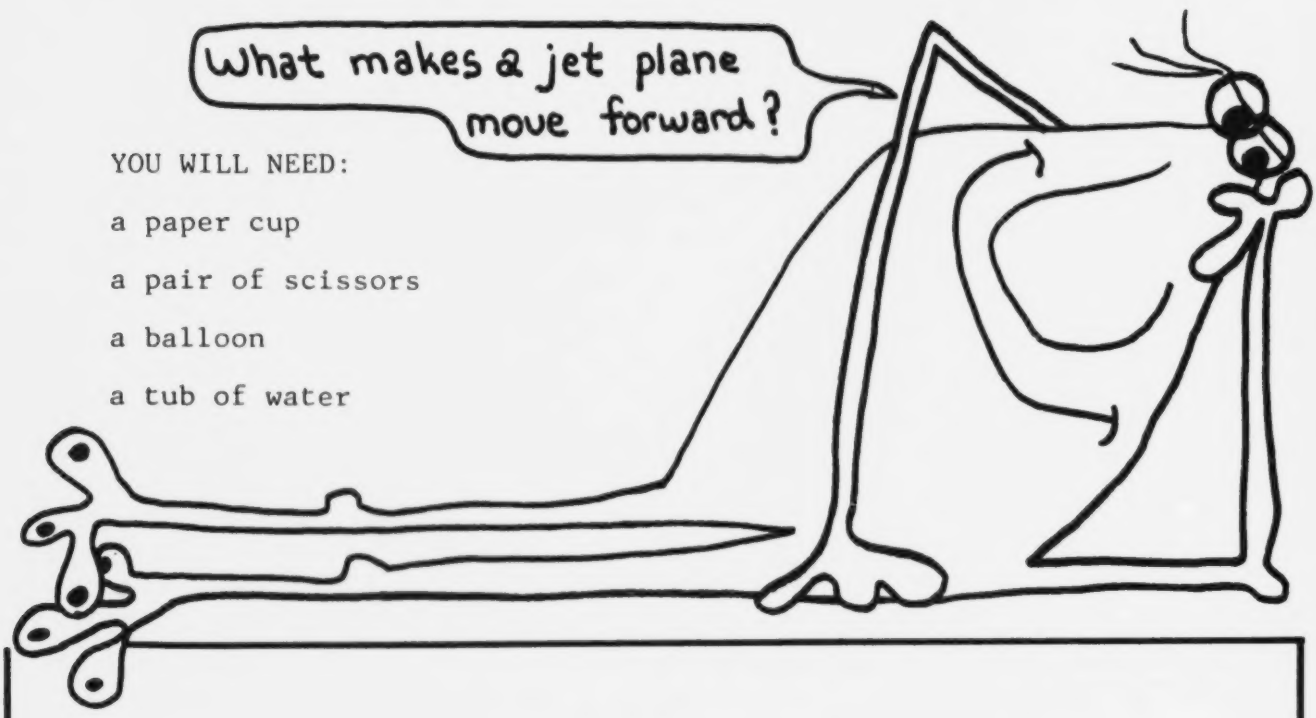
10. From this experiment what conclusions can you make about friction? _____
11. Do you think it is important to oil your skates if you are racing? _____ What would the oil do?

    _____

12. Rub your hands together as fast as you can. Does it feel warm? _____ Why? _____
13. Put some cream on your hands and rub them together as fast as you can again. Do they feel as warm? _____ What did the cream do? _____
14. What new conclusions can you make about friction? _____

    _____

JET PROPULSION



YOU WILL NEED:

a paper cup

a pair of scissors

a balloon

a tub of water

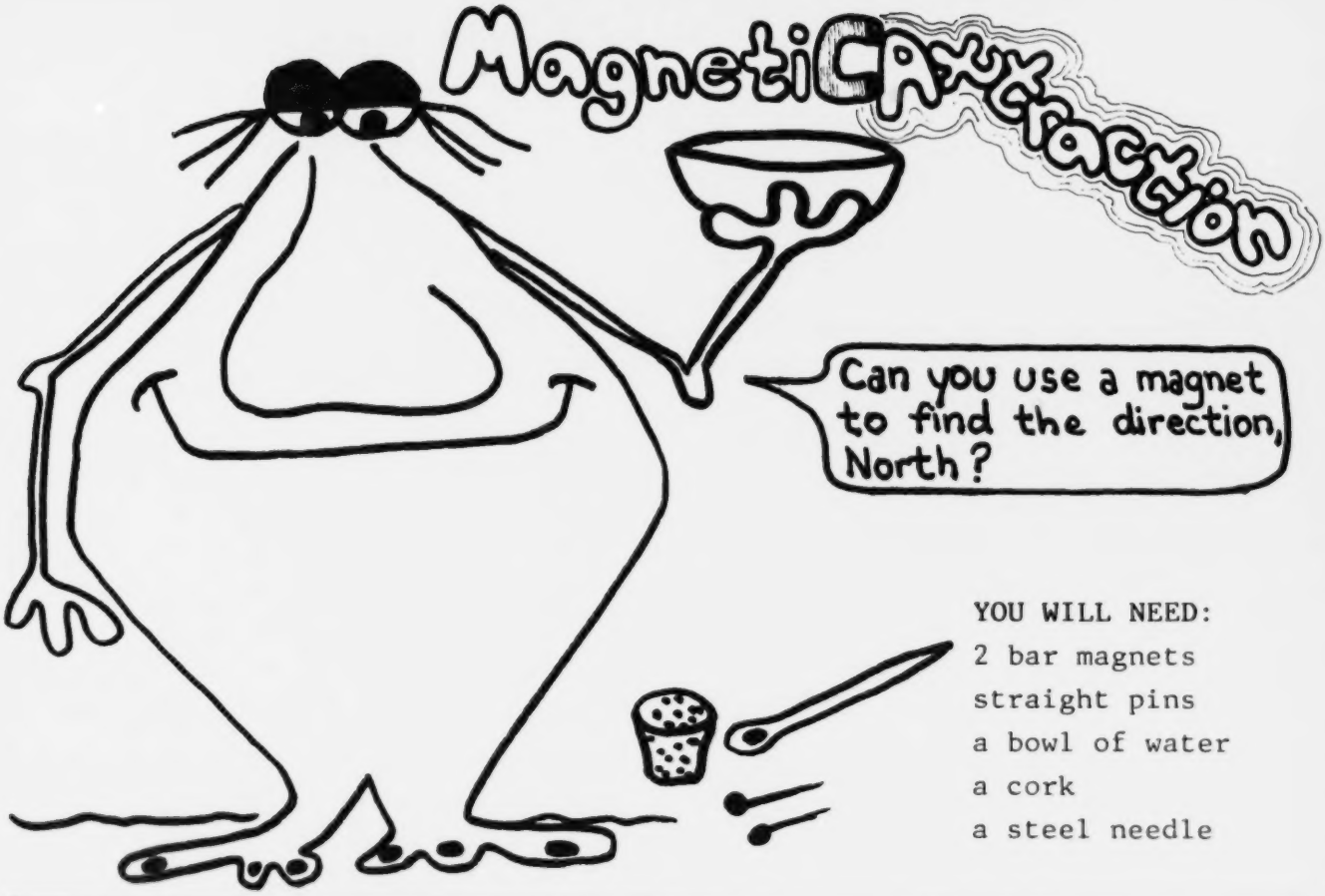
DIRECTIONS: Cut around the cup at about one or two inches from the bottom. Punch a 1/4 inch hole in the bottom of the cup and pull one end of the balloon through the hole. Blow up the balloon. Hold the end of the balloon so the air will not escape. Place the "balloon jet" in a tub of water. Let go and watch it move along the water.

JET PROPULSION WORKSHEET

Get a friend who has also made a "balloon jet ". Race your jets. Experiment by making the hole in the bottom of the cup larger (3/8" to 1/2"). Does the "balloon jet" travel faster if the hole is larger? _____

Create your own "balloon jet ". Use a milk carton, a piece of cardboard, wood, or any other material you choose. See how creative you can be. Draw a picture of your creation in the box below.

Magnetic Attraction



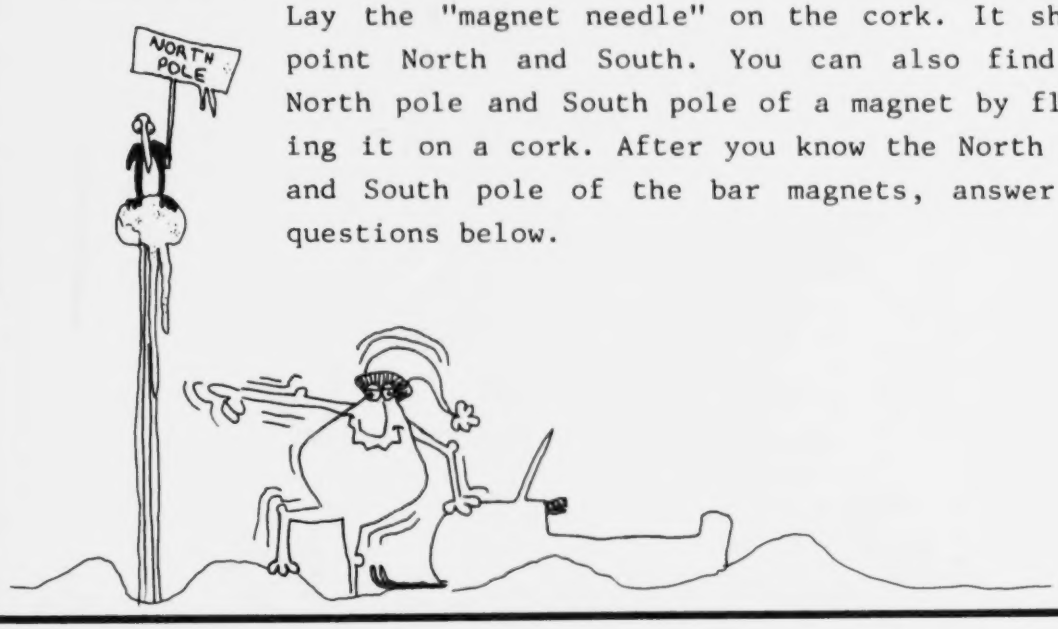
YOU WILL NEED:
2 bar magnets
straight pins
a bowl of water
a cork
a steel needle

DIRECTIONS: Hold the needle in one hand. Put the magnet in your other hand. Touch one end of the magnet to one end of the needle. Stroke the entire length of the needle with the magnet 100 times. Be careful that you do not rub back and forth. Stroke one way and use only one end of the magnet. Can your needle pick up a pin?

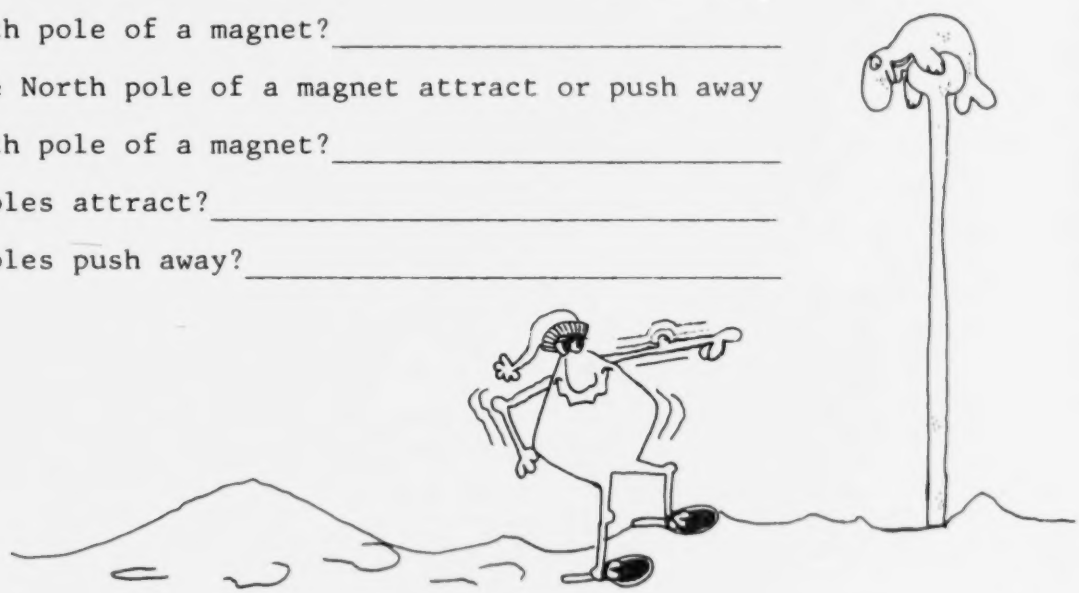
Use the Magnetic Attraction Worksheet to do another experiment with magnets.

Magnetic Attraction Worksheet

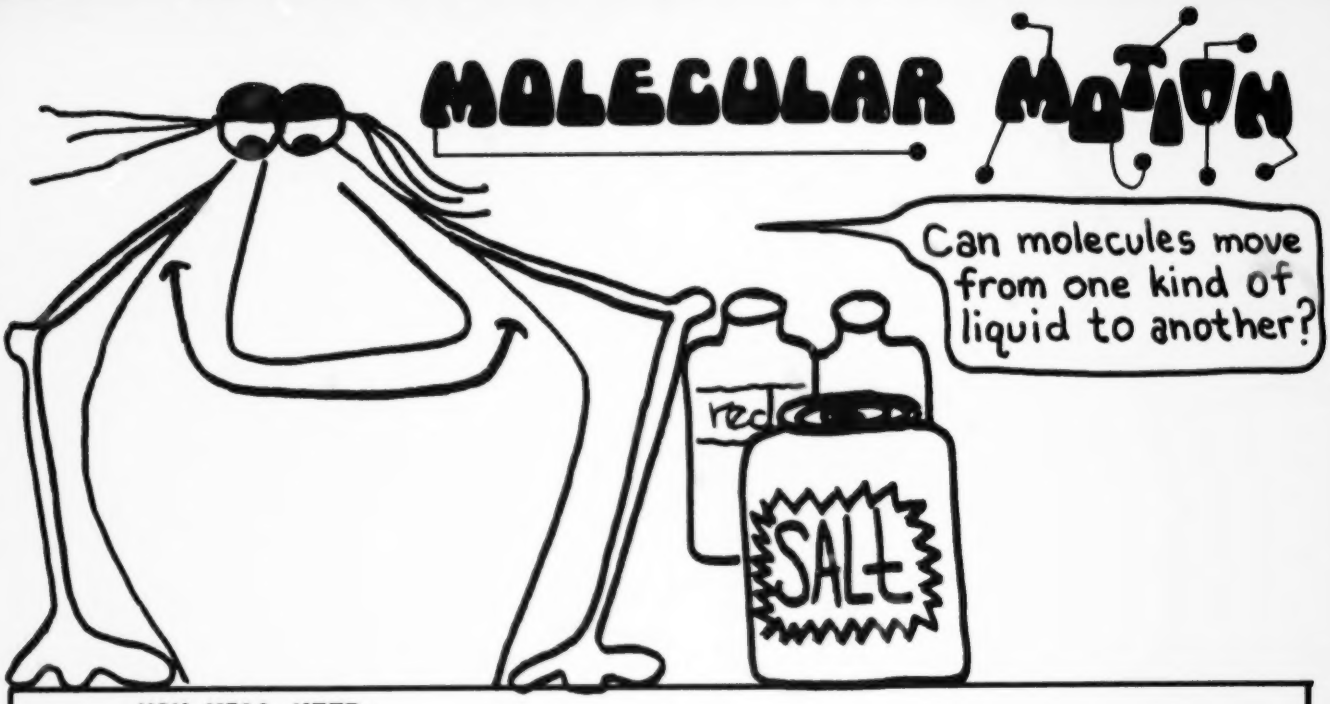
DIRECTIONS: Put the cork in the center of the bowl of water. Lay the "magnet needle" on the cork. It should point North and South. You can also find the North pole and South pole of a magnet by floating it on a cork. After you know the North pole and South pole of the bar magnets, answer the questions below.



1. Does the South pole of a magnet attract or push away the North pole of a magnet? _____
2. Does the South pole of a magnet attract or push away the South pole of a magnet? _____
3. Does the North pole of a magnet attract or push away the South pole of a magnet? _____
4. Does the North pole of a magnet attract or push away the North pole of a magnet? _____
5. Which poles attract? _____
6. Which poles push away? _____



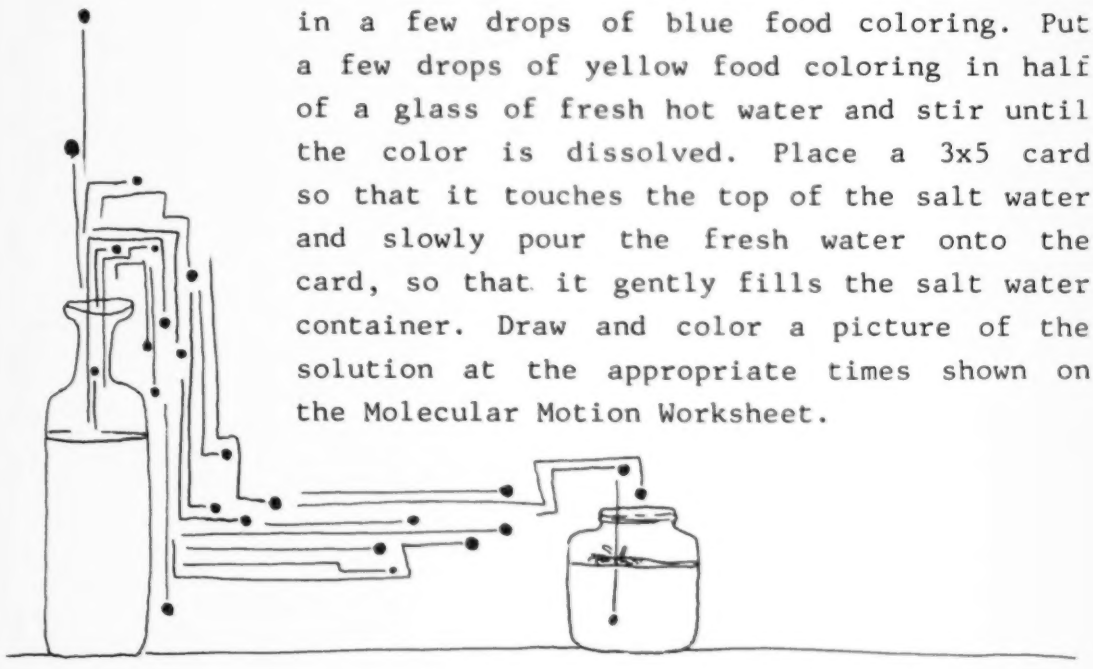
MOLECULAR MOTION



YOU WILL NEED:

2 jars	salt	blue food coloring
hot water	yellow food coloring	3x5 index card

DIRECTIONS: Fill a glass half-full of water. Pour salt into the hot water and stir until the water will not dissolve any more salt. Then stir in a few drops of blue food coloring. Put a few drops of yellow food coloring in half of a glass of fresh hot water and stir until the color is dissolved. Place a 3x5 card so that it touches the top of the salt water and slowly pour the fresh water onto the card, so that it gently fills the salt water container. Draw and color a picture of the solution at the appropriate times shown on the Molecular Motion Worksheet.



MOLECULAR MOTION WORKSHEET

Immediately after pouring fresh water into salt water container.	2 minutes after pouring fresh water into salt water container.
15 minutes after pouring fresh water into salt water container.	30 minutes after pouring fresh water into salt water container.
30 minutes after pouring fresh water into salt water container and stirring 30 seconds.	24 hours after pouring fresh water into salt water container.

REFLECTIONS

How do printed words look different when you look at them in a mirror?

YOU WILL NEED: a mirror, a pencil, a piece of paper

DIRECTIONS: Below are written the bottom half of some words. Stand a mirror up on the top of each row of letters and the reflection in the mirror will form the top half of each word. Can you read these words?

REFLECTIONS WORKSHEET

Write some bottom halves of words. See if a friend can guess the word before using a mirror.

Try your hand at writing backwards. First try to read the words below that are written backwards. If you cannot read the message, use a mirror to help you.

YOU ARE SPECIAL

Write a message backwards in the box below. Try it on a friend.

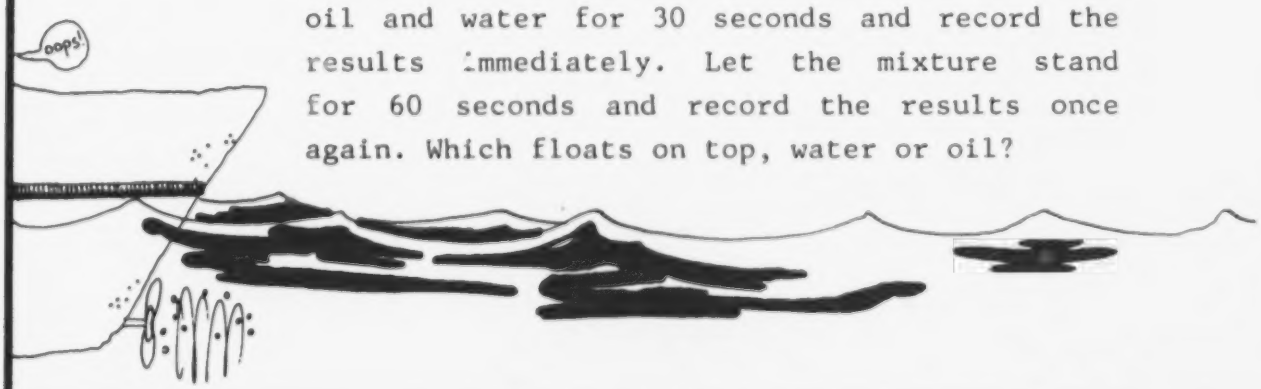
OILS

Can oil and water be easily mixed?

YOU WILL NEED:

1 tablespoon of salad oil
1 glass jar
cold water
blue food coloring
a spoon

DIRECTIONS: When oil spills into the ocean, which do you think are the most affected, plants and fish on the ocean surface or plants and fish on the ocean floor? Use the Oils Worksheet to draw and color each stage of this experiment. Put one tablespoon of oil in a glass jar. Add 3 or 4 drops of blue food coloring. Stir and then draw and color the results in the first box. Pour ½ cup of cold water into the jar of oil and coloring. Let it stand for a few seconds, record your results. Stir the oil and water for 30 seconds and record the results immediately. Let the mixture stand for 60 seconds and record the results once again. Which floats on top, water or oil?

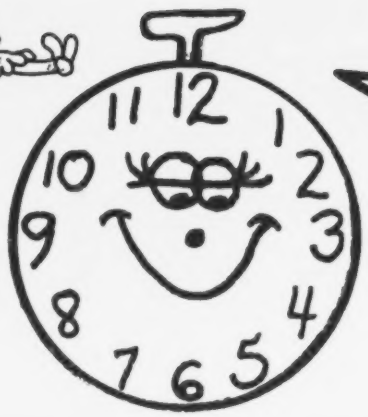


OILS WORKSHEET

blue food coloring in oil	oil and coloring in water
oil and coloring mixed with water	oil and food coloring after mixing and allowing to settle in water

Pulse Rate

Does your pulse always remain the same?



YOU WILL NEED:

a watch with a second hand, a pencil, ten friends

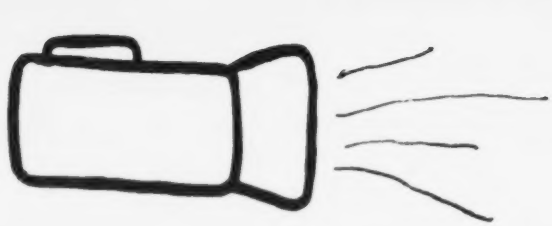
DIRECTIONS: Choose a partner and take their pulse by placing your finger on the inside of their wrist. You should feel a beating in your partners' arm. After you have found the pulse, count the number of beats in one minute. Look at the Pulse Rate Worksheet. Complete the worksheet by counting the pulse rate of 10 people sitting quietly, sitting quietly and thinking about speeding up the heart rate, after running in place for one minute, and after running in place for two minutes. Then answer the questions found below.

1. Did everyone's pulse beat the same?_____
   Why?_____
2. Did anyone cause their pulse to change just by thinking about it?_____
3. What happens to pulse rates after exercise?_____
   Why?_____
4. Who had the lowest sitting quietly pulse?_____

Pulse Rate Worksheet

NAME	SITTING QUIETLY	SITTING QUIETLY & THINKING ABOUT SPEEDING UP HEART RATE	AFTER RUNNING IN PLACE 60 SECONDS	AFTER RUNNING IN PLACE 2 MINUTES
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

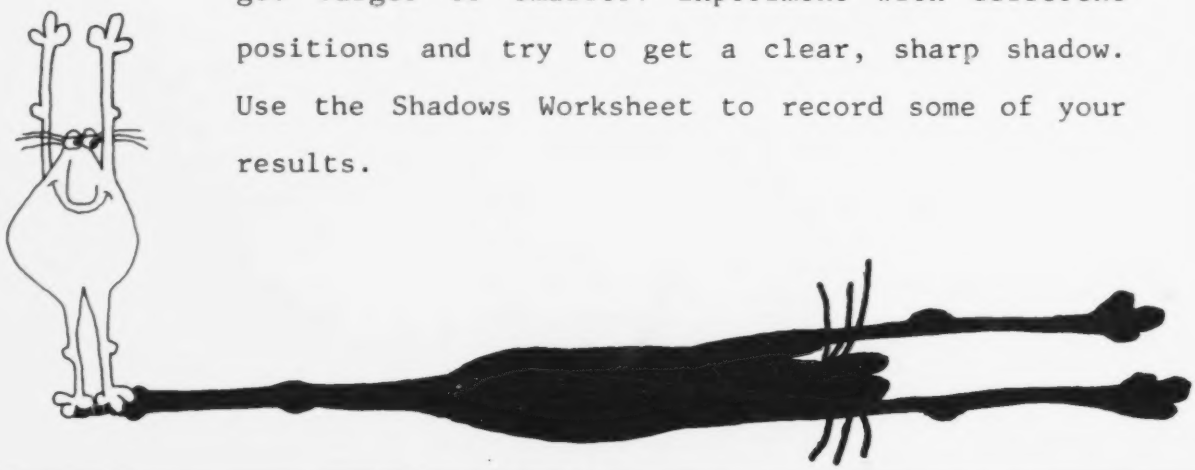
SHADOWS



How is a shadow like a motion picture projector?

YOU WILL NEED: A FLASHLIGHT A DARK ROOM

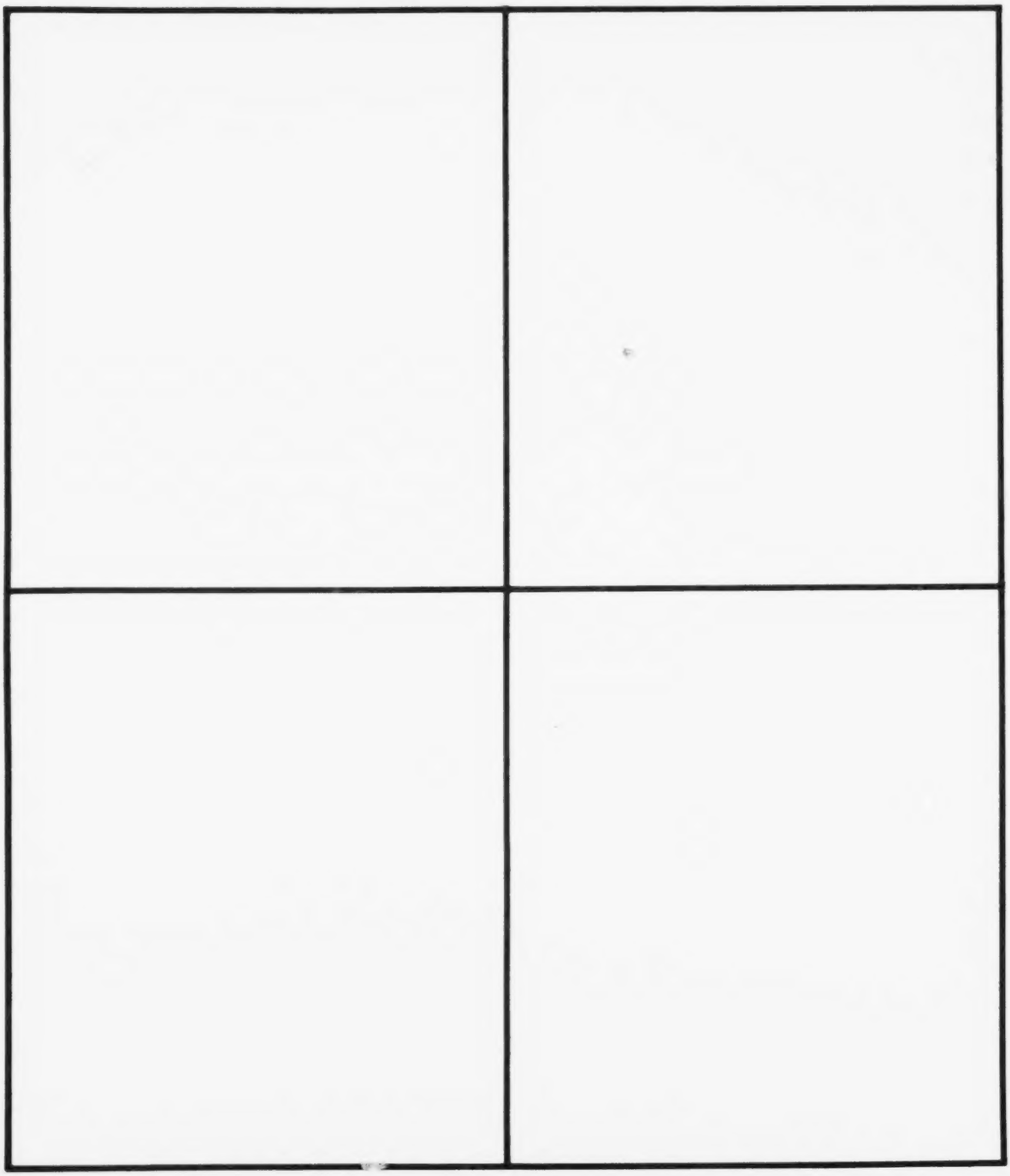
DIRECTIONS: Turn on the flashlight in a dark room. Place it on a table. Put your hand in front of it. Observe the shadow of your hand. Move toward the shadow of your hand. Does it get larger or smaller? Move the flashlight closer to the wall. Does the shadow get larger or smaller? Experiment with different positions and try to get a clear, sharp shadow. Use the Shadows Worksheet to record some of your results.



JUST FOR FUN: Sit on a chair directly in front of a wall. Have the flashlight placed so you can get a clear shadow of your profile. Tape a black sheet of paper to the wall. Have a friend draw the shadow of your profile on the black paper. Cut it out and take it home.

SHADOWS WORKSHEET

Make up some animals by using your hands to make shadows.
Draw a picture of the animal shadows below.



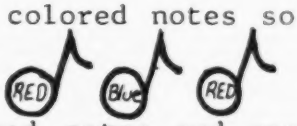
SOUNDS

Why do some sounds have a high pitch, while others have a low pitch?

YOU WILL NEED: food coloring, water, 6 pop bottles the same size, and crayons

DIRECTIONS: Fill 1/6 of the first bottle with water and add one drop of red coloring. Fill 1/3 of the second bottle with water and add one drop of red and 1 drop of blue coloring. Fill 1/2 of the third bottle with water and add 2 drops of blue coloring. Fill 2/3 of the fourth bottle with water and add 2 drops of yellow and 2 drops of blue coloring. Fill 5/6 of the fifth bottle with water and add 3 drops of yellow coloring. Fill the last bottle full of water and add 2 drops of yellow and 2 drops of red. Use the Sounds Worksheet to record a tune of your own.

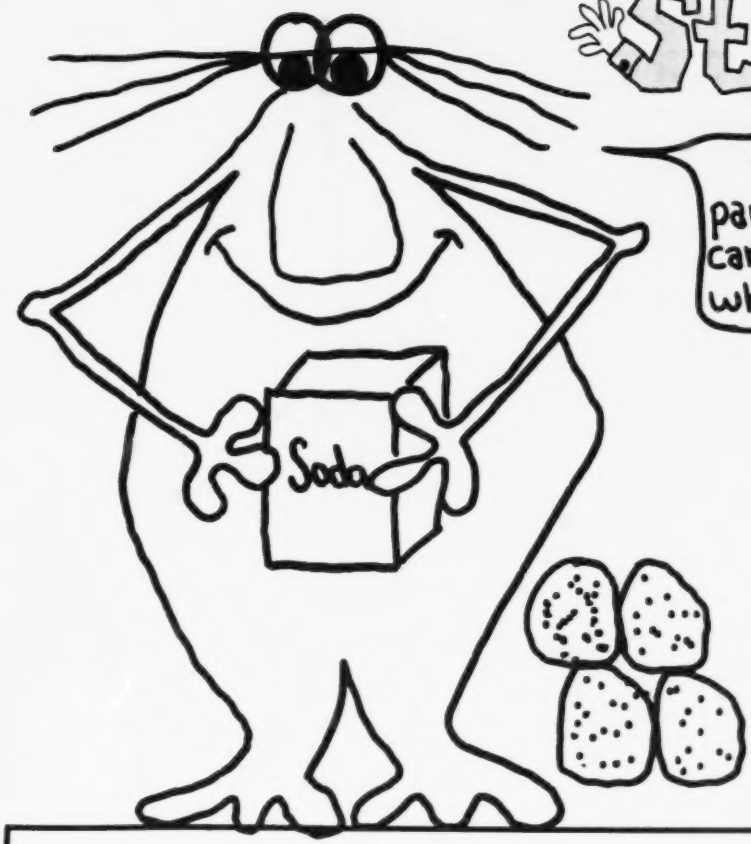
Sounds Worksheet

Blow across the top of the bottles to make a musical tone. Make up a little song and write the colored notes so you can read and repeat your tune. Example: 

See if a friend can read your colored notes and repeat your tune. Use the space below to record your song.

As you add water to the bottles, what happened to the pitch?

Starches



Starch is an important part of the food we eat. How can you test to find out which foods contain starch?

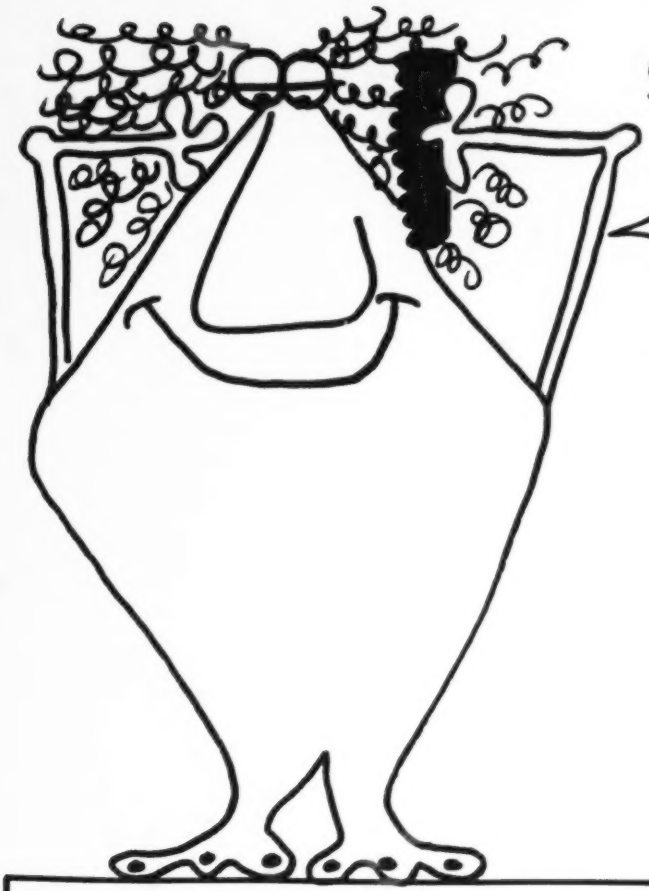
YOU WILL NEED:
a piece of potato
a cracker
a piece of bread
cornstarch
baking soda
iodine
3 other foods that you choose

DIRECTIONS: Put a piece of potato in the dish. Drop a tiny bit of iodine on the potato. Does it turn purple or black? If it turns purple or black, it contains starch. Use the Starches Worksheet to record each substance after you test them for starch. List three other substances of your choice on the worksheet and test them, too. Be sure you clean the dish between each test item. What substance that you tested seemed to have the most starch?

WARNING: TINCTURE OF IODINE IS A POISON. DO NOT TASTE ANY FOOD YOU HAVE TESTED WITH THIS CHEMICAL.

Starches Worksheet

SUBSTANCE TO BE TESTED:	DOES THE SUBSTANCE TURN PURPLE OR BLACK?	DOES THE SUBSTANCE CONTAIN STARCH?
POTATO		
CRACKER		
BREAD		
CORNSTARCH		
BAKING SODA		



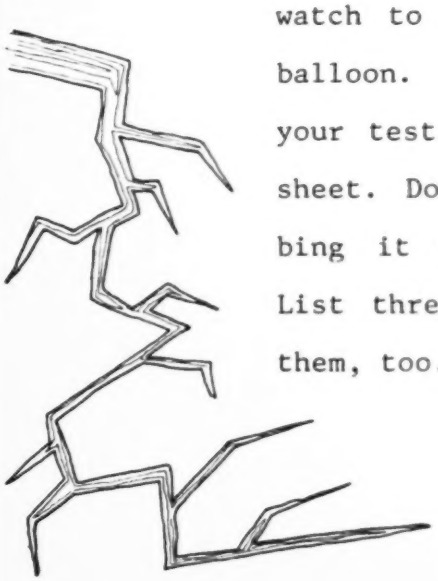
Static ELECTRICITY

Have you ever felt a spark jump from yourself to another person when you touched them? Do this experiment and make your own static electricity.

YOU WILL NEED:

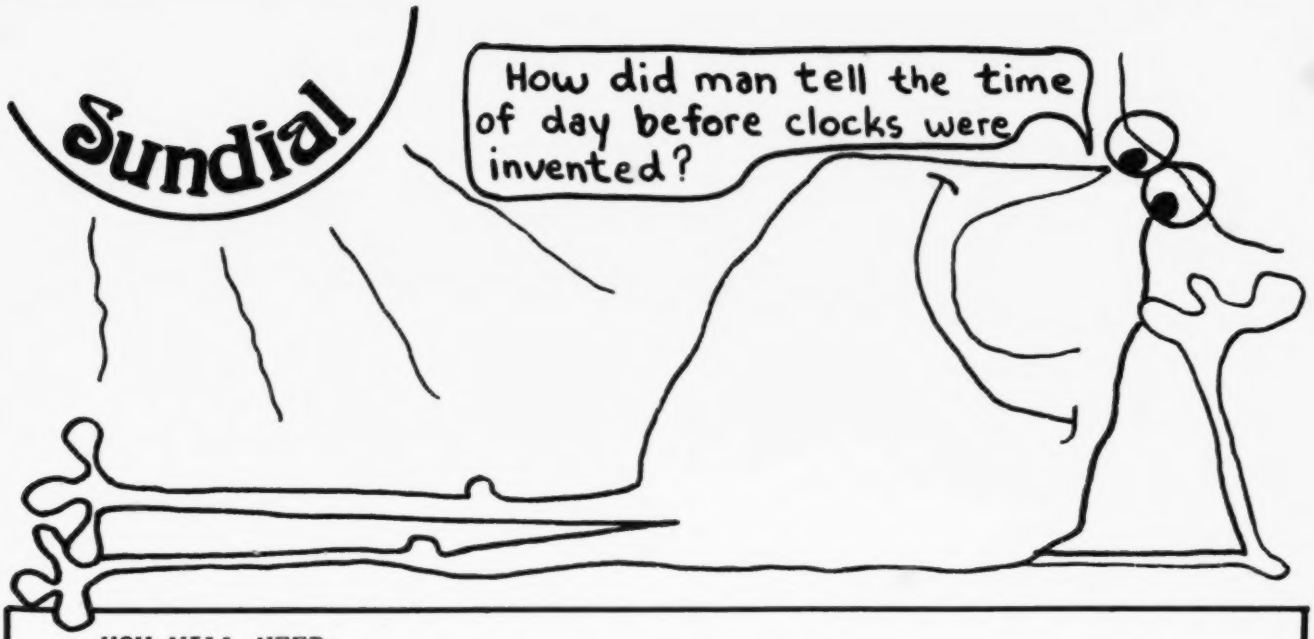
a dry, cold day
a piece of wool cloth
a comb
a ping-pong ball
bits of paper
a water faucet
a stop watch

DIRECTIONS: Wait for a dry, cold day to do this experiment. Rub the comb with a piece of wool. See if a blown up balloon will cling to the comb. Use the stop watch to see how long the comb will attract the balloon. Try some other objects and record all your test results on the Static Electricity Worksheet. Don't forget to recharge the comb by rubbing it with the wool between each test item. List three other items on the worksheet and test them, too.



Static Electricity WORKSHEET

TEST OBJECT:	NUMBER OF SECONDS THE OBJECT IS ATTRACTED BY THE COMB	WILL THE COMB LIFT THE OBJECT OFF THE GROUND?
A BLOWN UP BALLOON		
WATER		
A PING-PONG BALL		
TINY BITS OF PAPER		
YOUR FRIEND'S HAIR		

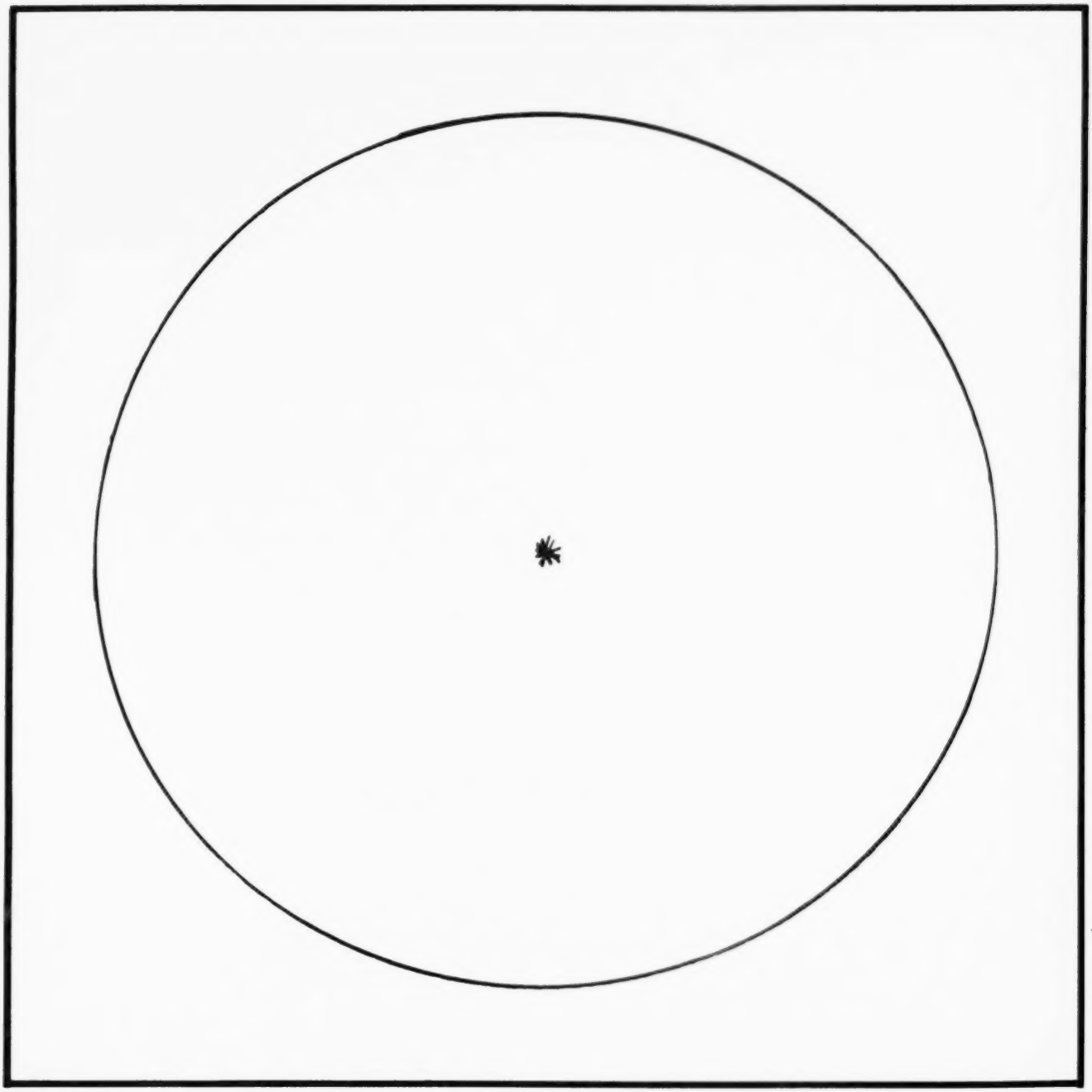


YOU WILL NEED:

2 pencils	glue
a piece of white cardboard	scissors

DIRECTIONS: Cut out the Sundial Worksheet. Carefully glue it to a piece of cardboard. Trim around the cardboard. Decorate the disk but leave the edges blank to mark off hours. Poke a pencil through the center of the disk and slide it halfway down the pencil. Place your sundial in the sun by poking the pencil into the ground. Do not move it. At each hour mark where the pencil makes a shadow and label the hour. After 12 hours you will have a completed sundial. You will have to record the shadows starting early in the morning, since you will not be able to record after dark. For example: record from 6:00 A.M. until 5:00 P.M.

SUNDIAL WORKSHEET



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Surface Tension

YOU WILL NEED:

a gauze bandage
a rubber band
a sink
water
a piece of cotton
a piece of nylon stocking

DIRECTIONS: Do this experiment over a sink. First put the gauze bandage over the opening of the bottle. Secure it with a rubber band. Make sure all edges are sealed off by the rubber band. Hold the gauze opening under the tap and watch the water rush in. Now carefully, holding the bottle over the sink, turn it upside down and hold the bottle level.

1. Does the water flow easily into the jar, through the gauze?_____
2. Does water flow out of the jar, through the gauze when the bottle is held upside down and level?_____
3. What happens if you shake the bottle while holding it upside down and level?_____
4. What happens if you hold the bottle sideways?_____
_____

Surface Tension Worksheet

	gauze	cotton	nylon
Does water rush in through the opening when held under tap water?			
Does water rush out of the opening when the bottle is held upside down and level?			
Does water rush out of the opening when the bottle is tipped upside down and shook?			
Does water rush out of the opening when tipped on one side?			

1. Which of the materials you used had the biggest openings?
   _____

2. Which materials did you find held the most water from rushing out when held upside down and level? _____

3. What conclusions can you make about surface tension?
   _____
   _____
   _____

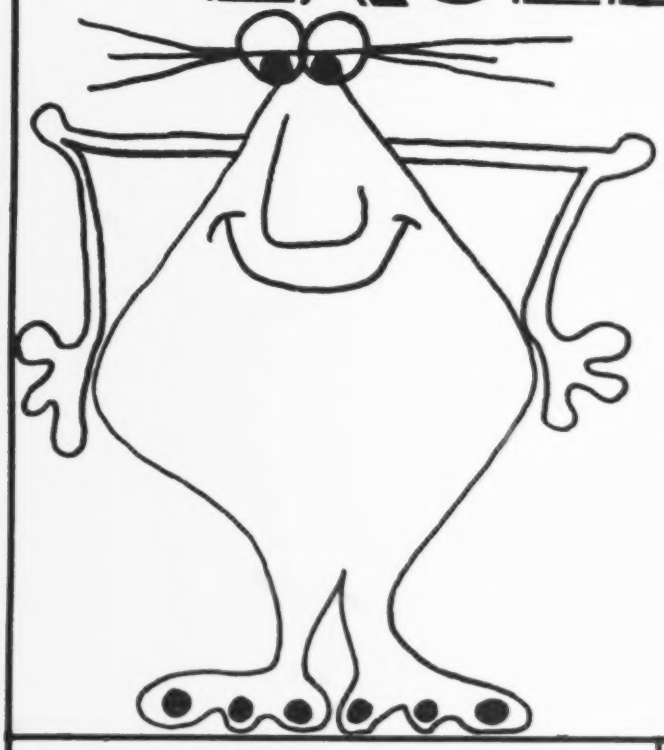
Science Word Search

WORD BANK:

ABSORPTION
CAPILLARY ACTION
AIR
COLORS
CONDENSATION
CONDUCTION
DISSOLVE
EVAPORATION
FRICTION
PROPULSION
MAGNET
MOLECULAR
OILS
REFLECTIONS
SHADOWS
STARCHES
SUNDIAL
VIBRATIONS

A	B	S	O	R	P	T	I	O	N	C
C	C	C	O	L	O	R	S	V	C	O
A	O	I	E	P	M	E	H	I	O	N
P	N	E	V	R	O	F	A	B	N	F
I	D	N	A	O	L	L	D	R	D	A
L	U	C	P	P	E	E	O	A	E	B
L	C	E	O	U	C	C	W	T	N	R
A	T	W	R	L	U	T	S	I	S	O
R	I	O	A	S	L	I	T	O	A	T
Y	O	R	T	I	A	O	A	N	T	E
A	N	D	I	O	R	N	R	S	I	M
C	M	S	O	N	E	S	C	S	O	V
T	A	E	N	M	A	G	H	V	N	A
I	G	A	C	O	N	D	E	I	O	C
O	N	R	C	O	N	S	S	B	I	B
N	E	C	S	U	N	D	I	A	L	E
E	T	H	V	I	B	R	A	T	S	N
A	I	R	F	R	I	C	T	I	O	N
D	I	S	S	O	L	V	E	T	I	O

EXCELLENT



To _____

for your outstanding work in Science!

_____

GOOD

For you, _____

you successfully completed 15 science experiments

_____

GREAT

To _____

because you successfully completed 20 science experiments

_____

GOOD APPLE BOOKS BY BECKY AND CHARLIE DANIEL INCLUDE:

FREAKY FRACTIONS
GOING BANANAS OVER LANGUAGE SKILLS
MY VERY OWN DICTIONARY
SUPER SPELLING FUN
TEACHER TIME SAVERS
THINKER SHEETS
WARM SMILES, HAPPY FACES
WRITING ABOUT MY FEELINGS
THE BIG ADDITION BOOK
THE BIG SUBTRACTION BOOK
THE MULTIPLICATION BOOK
THE DIVISION BOOK
WHAT'S NEXT?
READY, SET, READ!
COMPREHENSION ZOO
RHYMING AND READING
OH, MY WORD!
THE GREAT PAPER AIRPLANE FACTORY
ARITHMETRIX
I WONDER
THE SUPER-DUPER SCHOOL SCRAPBOOK
GOOD APPLE & TEACHER HELPERS
I CAN DRAW A CIRCUS
RAINBOW FACTORY

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